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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,152	08/27/2004	Martin PETERSSON	7589.197.PCUS00	5151

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EXAMINER	
MERKLING, MATTHEW J	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/711,152	PETERSSON ET AL.	
	Examiner	Art Unit	
	MATTHEW J. MERKLING	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/27/04, 2/13/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

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DETAILED ACTION

Information Disclosure Statement

1. The document Applicant listed in the IDS (filed 8/27/04) which indicates a US patent issued to Meusinger et al. was not considered as the patent number listed is invalid. The document was therefore, lined through.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 14, 16 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 recites the limitation "said second channel" in line 2. There is insufficient antecedent basis for this limitation in the claim. For purposes of this examination, this will be treated as referring to "said second chamber".

Claims 16 and 17 recite the limitation "the second membranes" in line 2. There is insufficient antecedent basis for this limitation in the claim. For purposes of this examination, this will be treated as referring to "said second chamber".

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-9, 14, 16-18 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Ogata (JP 2001-139304).

Regarding claim 1, Ogata discloses a system for generating hydrogen fuel for a fuel cell (see abstract), said system comprising:

a reforming process device (reformer catalyst, 6) for implementing a reforming process that converts primary fuel into hydrogen (see abstract); and

a membrane (7) having selective permeability for CO2 (see abstract), said membrane being essentially composed of ceramic material (see abstract).

Regarding claims 2, 3 and 4, Ogata further discloses a primary side of the membrane (outer side of tube 7, see Drawing 4) faces a first chamber (formed on the outside of permeable tubes 7), said first chamber being configured as a reaction chamber for at least a part of the reforming process (see Drawing 1 where reforming catalyst 6 are formed on the outside of membrane 7).

Regarding claim 5, Ogata further discloses said system is arranged to principally supply a primary fuel into the first chamber (via inlet 2, see Drawing 1).

Regarding claim 6, Ogata further discloses a secondary side of the membrane faces a second chamber (see inside of membrane tube 7).

Regarding limitations recited in claims **5-8 and 28** which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

Regarding claim 9, Ogata further discloses at least one heat exchanger (8, 10) arranged to transfer heat between at least one flow (A flow, see Drawing 1) leaving one of the chambers (primary chamber) and at least another flow (B flow, see Drawing 1) entering one of the chambers (primary chamber).

Regarding claim 14, Ogata further discloses said second chamber comprises a flow entering the second chamber (flow of carbon dioxide through the membrane).

Regarding claim 16, Ogata further disclose at least one of the first membrane and second chamber having a microporous structure (see paragraphs 16 and 17 where Ogata discloses carbon dioxide being adsorbed into the pores of the ceramic tubing 7).

Regarding claim 17, Ogata further discloses the membrane has a "zeolite-like structure" (or crystalline metallic oxide, see paragraph 11 of Ogata, LiZrO3).

Regarding claim 18, Ogata further discloses the system arranged in a mobile application (see abstract where Ogata discloses that said system un-necessitates the need for large-scaled devices, implying that said system is mobile).

6. Claims 19-22, 24-27 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Van Andel (WO 01/89665 A1).

Regarding claim 19, Van Andel discloses a system for generating hydrogen fuel for a fuel cell (page 1, lines 8-14), said system comprising:

a reforming process device for implementing a reforming process that converts primary fuel to hydrogen (fuel processor, page 1, lines 8-14); and

at least one cleaning device (membrane, see abstract) that cleans a flow of hydrogen fuel leaving the reforming process (see abstract); and

said cleaning device comprising a membrane (page 2 lines 15-26) having selective permeability for CO (page 2 lines 15-26), and said membrane being essentially composed of ceramic material (page 2 lines 15-26).

Regarding claim 20, Van Andel further discloses a primary side of the membrane (side which comes into contact with the reformate, page 2 lines 27-30) facing a first channel through which the flow of hydrogen fuel passes; and

a secondary side (opposite side of membrane which is in contact with the reformate stream) of the membrane is at least partially coated with a layer of oxidation catalyst (page 2 lines 27-30).

Regarding claim 21, Van Andel further discloses said secondary side of said membrane faces a second channel through which a flow of an oxygen-containing flushing gas is arranged to pass (see page 3 lines 9-17 where Van Andel discloses passing the cathode exhaust gas on the secondary side of the membrane to remove the permeate as well as assist in oxidizing the carbon monoxide).

Regarding limitations recited in claims **21, 22 and 29** which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

Regarding claim 24, Van Andel further discloses said membrane is composed of a microporous structure (page 2 lines 15-26).

Regarding claims 25 and 27, Van Andel further discloses said membrane exhibits a zeolite structure (page 2 lines 15-26).

Regarding claim 26, Van Andel further discloses said system is arranged in a mobile application (compact fuel cell, page 3 lines 9-17).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 10-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogata (JP 2001-139304) as applied to claim 2 above, and further in view of Van Andel (WO 01/89665 A1).

Regarding claim 10, Ogata teaches reforming a fuel into a hydrogen enriched gas which also comprises carbon monoxide (see paragraph 14), but Ogata does not teach:

a second membrane exhibiting selective permeability for CO, said second membrane being arranged to separate CO from a flow of hydrogen fuel leaving the reforming process device.

Van Andel also discloses a fuel reforming system that produces hydrogen enriched gas from a hydrocarbon fuel (see abstract).

Van Andel teaches the removal of carbon monoxide from the hydrogen enriched gas by utilizing a membrane that exhibits selective permeability to carbon monoxide (see abstract). Van Andel teaches the removal of carbon monoxide via a membrane in order to prevent the degrading qualities that carbon monoxide causes to PEM fuel cells, even at low concentrations (page 1 lines 15-21).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the carbon monoxide selective membrane of Van Andel, to the system of Ogata, in order to remove the carbon monoxide and prevent poisoning of a PEM fuel cell.

Regarding claim 11, Ogata, as modified by Van Andel, further discloses the second membrane is essentially composed of ceramic material (see page 2, lines 15-26 of Van Andel).

Regarding claim 12, Ogata, as modified by Van Andel, further discloses said primary side of the second membrane (side in which is contacted with the hydrogen/carbon monoxide flow) faces a first channel through which the flow of hydrogen fuel pass, and wherein said secondary side of the second membrane is at least partially coated with a layer of oxidation catalyst (see page 2, lines 27-30 of Van Andel where Van Andel discloses using an oxidation catalyst on the secondary side of the membrane).

Regarding limitations recited in claim **13** which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said

limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

Regarding claim 15, Ogata, as modified by Van Andel does not explicitly disclose that the second membrane is selectively permeable to carbon dioxide. However, seeing from Ogata that it is preferable to remove carbon dioxide from the product hydrogen stream (see abstract), providing a duplicate carbon dioxide permeable membrane would amount to a mere duplication of parts. It has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

10. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Andel (WO 01/89665 A1) as applied to claim 19 above, and further in view of Ogata (JP 2001-139304).

Regarding claim 23, Van Andel teaches a system which purifies a reformate stream for use in a fuel cell, but does not discloses a membrane has a selective permeability to CO2.

Ogata also discloses a system which purifies a reformate stream for use in a fuel cell.

Ogata teaches a membrane for selective permeation of CO2 for the removal of carbon dioxide from a reformate stream in order to avoid discharging CO2 to the atmosphere which is a key contributor to global warming (paragraph 3).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the CO2 permeable membrane of Ogata, to the separation membrane of Van Andel in order to avoid emitting carbon dioxide into the atmosphere.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795